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An improved implantable sensor system is disclosed that includes an array of sensors. Each of the sensors is associated with a protective member that prevents the sensor from interacting with the surrounding environment. At a selected time, the protective member may be disabled, thereby allowing the sensor to begin sensing signals within a living body. In one embodiment, the protective member is formed of a conductive material that can oxidize, is biocompatible, bio-absorbable, and that may be dissolved in solution such as blood upon application of an electric potential. In another embodiment, the protective member is formed of a dissolvable member that dissolves within the body over a predetermined time period.